DEPARTMENT OF THE ARMY
HEADQUARTERS, 44TH MEDICAL BRIGADE
FORT BRAGG, NORTH CAROLINA 28307-5000

REPLY TO
ATTENTION OF:

AFZA-MB-PM

14 March 2000

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Heat Injury Prevention

1. Last year 112 Fort Bragg soldiers experienced heat exhaustion and 21 experienced heat stroke. The 44th Medical Brigade was not immune to these statistics; we had five soldiers diagnosed with heat exhaustion and one with heat stroke. I am convinced heat injuries are preventable when soldiers are properly educated and trained, and when there is proper command emphasis and first line supervisors get actively involved in prevention.

2. As part of Force Health Protection, it is absolutely incumbent upon us as LEADERS to ensure our soldiers attend heat injury awareness classes. This training must be conducted prior to the onset of warm weather. In the Brigade Safety SOP, I directed that these classes take place.

3. The four enclosures are to assist you in your heat injury prevention program.

4. POCs are MAJ Swalko and LTC West at 7-4223/4224

KENNETH L. FARMER, JR.
Brigadier General, USA
Commanding

4 Encls
1. Information Paper, Wet Bulb Globe Temperature
2. Information Paper, Heat Injury Prevention
3. Fluid Replacement Guidance
4. Heat Injury Information For Commanders

DISTRIBUTION:
B, C, E, G

INFORMATION PAPER

44th MEDICAL BIGADE, PREVENTIVE MEDICINE
FORT BRAGG, NC 28310-5000

WET BULB GLOBE TEMPERATURE (WBGT)

6 March 2000

Purpose

To inform commanders and medical personnel of the WBGT as a tool in the protection of their soldiers from heat injury.

Facts

Exposure to high environmental temperature produces stress on the body, which may lead to a heat injury. Heat injuries are preventable and are the responsibility of leaders and soldiers at all levels.

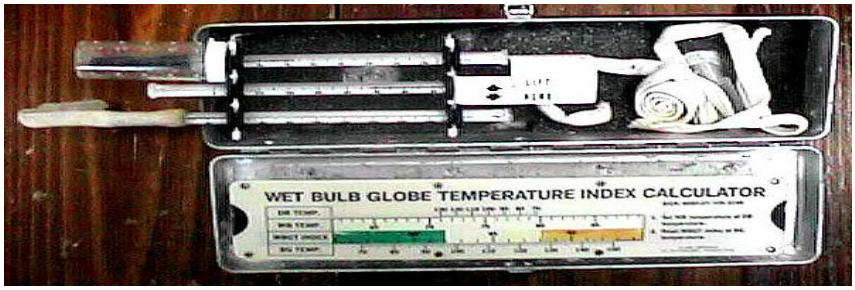
Accurate and timely information on weather conditions is a critical consideration to commanders and supervisors whether they are planning physical training, a field training exercise, or participating in battle.

The Environmental Health Section at Womack Army Medical Center and the 82nd Airborne Division's Preventive Medicine Section monitor temperatures at Fort Bragg throughout the day. However, temperatures vary across Fort Bragg and readings at troop location may not always match with the fixed location readings. Thus, temperatures at training sites away from the main post are likely to differ affecting water intake and work/rest cycles.

Commanders are required by FORSCOM Regulation 700-2 and the 44th Medical Brigade Field Sanitation Standing Operating Procedures to purchase the Wet Bulb Globe Temperature (WBGT) devise as part of their Field Sanitation Team compliment. Field Sanitation Team members are trained to operate the WBGT and therefore, best able to monitor the heat category at the unit's training site to ensure proper work/rest cycles and proper fluid intake. The advantages of the WBGT are instant access, local temperature readings, immediate implementation of recommended heat category measures, durability, and, ease of use.

WET BULB GLOBE TEMPERATURE

NSN 6665-01-381-3023
Cost = $251.07



Assistance

POC for assistance or information is MAJ Swalko or LTC West at 7-4223/4224.

I N F O R M A T I O N P A P E R

44th MEDICAL BIGADE, PREVENTIVE MEDICINE
FORT BRAGG, NC 28310-5000

HEAT INJURY PREVENTION AND TREATMENT

6 March 2000

1. Heat injuries are unnecessary and preventable. The individual soldier, first line supervisor, and the commander are responsible for the prevention of heat injuries.

2. Prevention of heat injuries.

a. **Water**: Individuals may lose more than one quart of water per hour from sweating. If this amount of fluid is not replenished through continuous consumption, body temperatures rise, work output decreases, and heat injury susceptibility increases. DRINK PLENTY OF WATER!

b. **Salt**: The military diet usually provides adequate dietary salt. Excessive intake of salt should be avoided; it may cause increased thirst and intestinal disturbance. Normal salting of food is more than adequate.

c. **Physical condition**: Individuals in good physical condition are less likely to suffer a heat injury.

d. **Acclimatization**: A period of approximately two weeks with progressive degrees of heat exposure and physical exertion should be allowed for substantial acclimatization. Limit intensity and time of training programs for soldiers not acclimatized to heat.

e. **Work schedules**: Tailor the work schedules to fit the climate, the physical condition of personnel, and military situation. Take advantage of the cooler hours in the day to accomplish physically demanding work. The schedule should gradually increase exposure during the hotter parts of the day rather than complete exclusion of work at that time. For example, schedule road marches at 0500 instead of 0630.

f. **Protection from the environment with proper clothing**: Clothing should be loose fitting especially at the neck, wrists, waist, and lower legs to allow air circulation. Loose clothing allows air to move over and cool the skin. Remove the BDU top and unblouse BDU pants (garrison areas only- in field, keep pants bloused for protection against ticks) whenever possible.

g. **Participation in training**: All personnel should be informed of the potentially serious results of heat injury, the general nature of these conditions, and how they can be prevented.

3. Factors influencing heat injuries.

a. **Unacclimatized personnel**: Personnel relocating from cooler climates to environments having greater temperatures require proper acclimatization. Without adequate time for adjustment to the new environment, heat injury increases.

b. **Overweight and fatigue**: Impairs the body's ability to lose heat. Being overweight makes the body fatigue faster. Fatigued soldiers are more likely to make judgement errors.

c. **Heavy meals and hot foods**: Hot meals add heat, which must be eliminated. Heavy meals divert blood flow to the digestive tract from the extremities. Blood flow through the extremities is one of the natural ways that the body cools itself.

d. **Alcohol/drugs**: Alcoholic beverages will decrease the ability of the body to deal effectively with heat stress. Drugs which inhibit sweating such as atropine, antihistamines, some tranquilizers, cold medicines, and some antidiarrheal medications markedly impair heat loss when temperatures are high.

e. **Fever**: Increases the amount of heat to be dissipated by the body.

f. **Tight clothing**: Restricts circulation and impedes movement of air over the skin diminishing bodies ability to lose heat.

4. In order to identify different heat injuries you must be able to recognize the symptoms. There are three clinical types of heat injuries: heat cramps, heat exhaustion, and heat stroke.

a. **Heat cramps** are caused by loss of salt and water from the body. Symptoms are mild to severe cramping in the legs, arms, and abdomen. Heat cramps may occur in the presence of heat exhaustion. Body temperature will remain normal unless heat cramps are accompanied by heat exhaustion.

TREATMENT

(1) Move the casualty to a cool or shady area.
(2) Loosen clothing (non-chemical environment).
(3) Have patient slowly drink one full canteen of water.
(4) Seek medical attention.

DRINK WATER!

b. **Heat exhaustion** is caused by an excessive loss of salt and water. Symptoms include profuse sweating, headache, tingling sensations in the hands and feet, paleness, difficulty breathing, loss of appetite, nausea and vomiting. The skin is cool and moist. Pulse is rapid (120-200 b/p/m) and the blood pressure may be low. Classic signs/symptoms of heat exhaustion are trembling, weakness, lack of coordination, and a slight clouding of the senses to momentary loss of consciousness.

TREATMENT

(1) Move the casualty to a cool or shady area.
(2) Loosen or remove patients clothing and boots.
(3) Pour water on patient and fan him/her.
(4) Have patient slowly drink at least one full canteen of water.
(5) Elevate patient's legs.
(6) Casualty should rest the remainder of the day.
(7) Seek medical attention.

c. **Heat stroke** is a MEDICAL EMERGENCY and can be life threatening. Heat stroke occurs when the body is unable to cool itself by sweating. Early signs/symptoms of heat stroke are headache, dizziness, delirium, weakness, nausea, vomiting, and skin is usually hot, flushed and dry. A casualty may first progress through heat cramps or heat exhaustion. The onset of heat stroke is usually abrupt with sudden loss of consciousness, convulsions, and delirium. Respirations are rapid and deep. As the soldier's condition worsens, cyanosis is generally seen and coma may ensue. Treatment of heat stroke must begin immediately with lowering the body temperature by any means possible. If body temperature is not lowered rapidly, the probability of death increases significantly. Heat stoke victims are more susceptible to future heat injuries; thus, command awareness and care must be taken by the individual to avoid a second exposure to the precipitating condition.

TREATMENT

(1) Move casualty to a cool or shaded area.
(2) Loosen or remove casualties clothing (unless in a contaminated environment).
(3) Pour water on the casualty; fanning him to permit a cooling effect of evaporation.
(4) Gently massage the extremities and skin which increases blood flow to those body areas and thus, aiding the cooling process.
(5) Elevate the casualty's legs.
(6) Make casualty slowly drink one full canteen of water (if conscious).
(7) Seek medical aid immediately. IV hydration should begin as soon as possible.

5. Each unit is required by AR 40-5 and 44th Medical Brigade's FST SOP to have a trained Field Sanitation Team (FST). Commanders must ensure unit FSTs are properly trained, equipped, and given the latitude to execute their FST missions. The FST are trained on the proper operation of the Wet Bulb Globe Temperature (WBGT) Index. The WBGT should be utilized for all training events.

6. Heat injuries are considered a serious incident. Depending on the severity of the heat injury, a serious incident report (SIR) and/or an Abbreviated Ground Accident Report (AGAR) may be required for each injury IAW Brigade's Safety SOP, AR 385-40, AR 190-40, and FORSCOM Suppl 1 to AR 190-40. Heat stroke involving one or more soldiers during a training event or non-training event is a reportable serious incident per AR 190-40. Additionally, a heat injury incident involving a group of soldiers (e.g. five heat exhaustion cases) would also be a Reportable Serious Incident. All heat injuries, regardless of classification, will be reported using an AGAR and submitted up through the chain of command to the Brigade Safety Officer/NCOIC.

7. For further information contact MAJ Swalko or LTC West at 910-907-4223 or DSN 337-xxxx or your supporting preventive medicine section.

Fluid Replacement Guidelines for Warm Weather Training
(Applies to average acclimated soldier wearing BDU, Hot Weather)

Heat Category	WBGT Index, °F	Easy Work		Moderate Work		Hard Work	
		Work /Rest	Water Intake, Qt/hr	Work /Rest	Water Intake, Qt/hr	Work /Rest	Water Intake, Qt/hr
1	78-81.9	NL	½	NL	¾	40/20 min	¾
2 (Green)	82-84.9	NL	½	50/10 min	¾	30/30 min	1
3 (Yellow)	85-87.9	NL	¾	40/20 min	¾	30/30 min	1
4 (Red)	88-89.9	NL	¾	30/30 min	¾	20/40 min	1
5 (Black)	> 90	50/10 min	1	20/40 min	1	10/50 min	1

- The work:rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary ± ¼ qt/hour.
- NL= no limit to work time per hour.
- Rest means minimal physical activity (sitting or standing), accomplished in shade if possible.
- **CAUTION: Hourly fluid intake should not exceed 1½ quarts.**
- **Daily fluid intake should not exceed 12 quarts.**
- Wearing body armor add **5°F** to WBGT Index
- Wearing MOPP overgarment add **10°F** to WBGT Index.

Easy Work	Moderate Work	Hard Work
• Walking Hard Surface at 2.5 mph, ≤ 30 lb Load • Weapon Maintenance • Manual of Arms • Marksmanship Training • Drill and Ceremony	• Walking Hard Surface at 3.5 mph, < 40 lb Load • Walking Loose Sand at 2.5 mph, no Load • Calisthenics • Patrolling • Individual Movement Techniques. i.e. low crawl, high crawl • Defensive Position Construction • Field Assaults	• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load

USARIEM 4 December 98

Encl 3

HEAT INJURY
INFORMATION FOR COMMANDERS

Introduction:

- Heat injury is a clinical syndrome that occurs when the body can no longer maintain its normal temperature range.
- Troops are at greatest risk at the beginning of the heat season.
- Heat injury is preventable by command intervention.

Overview/pathophysiology:

- The human body maintains a narrow temperature range. When exposed to hot environments or increased heat loads (working in hot environments), the body will increase sweating to dissipate heat. Sweating cools the body through evaporation.
- The body can sweat up to two liters per hour for short periods of time.
- Sweating is a finite process; eventually no more heat can dissipate through this means and the core temperature of the body rises. This, along with a decreased plasma volume due to fluid losses, increases the soldier's risk to heat injury.

Heat illness:

- Heat illness is a clinical spectrum of signs and symptoms relating to underlying organ damage, from the mild heat cramps to the serious heat stroke.
- Heat Cramps – painful contractions of the muscles of the legs and back that typically occur after working in a hot environment. They may be related to salt depletion due to sweating. They can occur during work or 1-2 hours following cessation of the work activity.
- Heat Exhaustion – more serious form of heat injury than heat cramps. Signs/symptoms of heat exhaustion include headache, fatigue, dizziness, chills, nausea, moist skin, and vomiting.
- Heat Stoke – most serious form of heat injury. Signs are similar to heat exhaustion, but skin is dry and individual shows agitation, confusion, and possible coma. Heat stoke can rapidly lead to death due to body's inability to get rid of its heat via sweating and kidney failure.

Acclimatization:

- The human body can acclimatize to working in hot environments. This process generally takes approximately two weeks of continuous exposure to heat and adequate hydration.

Acclimatization results in a more effective sweating process, wherein the threshold temperature to start sweating is lower and the sweat contains less salt. This results in earlier cooling and increased plasma volume that helps to maintain normal body function.

- Fluid requirements remain the same in hot environments even after acclimatization.

- You cannot speed up the acclimatization process by water deprivation during training.

Prevention - Command Emphasis:

- Commanders need to ensure adequate water intake of all soldiers, by providing time to drink and urinate during work periods.

- Soldiers need to drink even if they do not feel thirst. The thirst mechanism is not activated until the body is 1-2 % dehydrated. This corresponds to a 1-liter deficit.

- Soldiers need to eat their field rations. This provides for adequate sodium and calorie intake to replenish that lost during sweating.

- The skin is an essential organ for proper thermoregulation. Prevention of sunburn by using sunscreen and proper wearing of uniform while in the sun is necessary.

- Commanders need to follow the work/rest cycles that are provided by the WBGT (Wet Bulb Globe Temperature Index) for their particular environmental location. Accurate index readings from the WBGT require readings be taken from troop location(s). Each unit is required to have a WBGT per FORSCOM Reg. 700-2 and 44th Medical Brigade's Field Sanitation SOP for this purpose.

- The maximum absorption of water from the gut is 1.2 liters per hour. Under extreme environmental conditions, a person can lose up to two liters of water per hour. Therefore, soldiers can become progressively dehydrated unless given opportunities to cool off and reduce his/her body temperature. This is accomplished during rest cycles.

- Unit Field Sanitation Teams (FSTs) are trained to provide heat injury prevention/awareness classes to your soldiers and should be utilized for such training prior to the hot season. FSTs also are trained and equipped with WBGT to monitor heat conditions and advise unit commanders regarding water requirements, work-rest cycles, etc.

Summary:

- Heat injuries mean the loss of a productive soldier for 24-72 hours or more, but can also lead rapidly to death of a soldier.

- Heat injuries are prevented by educating soldiers and leaders, and through command influence.